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Sphingidae (Moths) of Rancho Grande, North Central Venezuela.[1]

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[This is one of a series of papers resulting from the 45th and 46th Expeditions of the Department of Tropical Research of the New York Zoological Society, made during 1945 and 1946 under the direction of Dr. William Beebe with headquarters at Rancho Grande in the National Park of Aragua, Venezuela. The expeditions were made possible through the generous cooperation of the National Government of Venezuela and of the Creole Petroleum Corporation.

[The characteristics of the research area are in brief as follows: Rancho Grande is located in north central Venezuela (10° 21′ N. Lat., 67° 41′ W. Long.), 80 kilometers west of Caracas, at an elevation of 1,100 meters in the undisturbed montane cloud forest which covers this part of the Caribbean range of the Andes. Adjacent ecological zones include seasonal forest, savanna, thorn woodland, cactus scrub, the fresh water lake of Valencia and various marine littoral zones. The Rancho Grande area is generally subtropical, being uniformly damp throughout the year because of the mountain cloud cap. The dry season extends from January until April. The average humidity during the expeditions, including parts of both wet and dry seasons, was 92.4%; the average temperature during the same period was 18°C.; the average annual rainfall over a 5-year period was 175 cm. The flora is marked by an abundance of mosses, ferns and epiphytes of many kinds, as well as a few gigantic trees. For further details, see Beebe & Crane, *Zoologica*, Vol. 32, No. 5, 1947. Unless otherwise stated, the specimens discussed in the present paper were taken in the montane cloud forest zone, within a radius of 1 kilometer of Rancho Grande.]

CONTENTS.

I. INTRODUCTION.

The spinx moths discussed in this paper were collected at Rancho Grande, Venezuela, during 1945 and 1946. Sixty-seven species came to the lights installed on the roof of the Department of Tropical Research laboratory—a result undoubtedly favored by the fact that the lights were placed high and threw their beams far over the forest. The roof of the laboratory is about 50 feet from the ground.

Three 100-watt electric bulbs were used to attract the moths, one facing south, one west, and one north. White cement walls aided in reflecting the light and also served as a resting place for the moths. Since these walls were only seven or eight feet high, it was possible to reach any desired specimen.

The south and west bulbs which cast their light over a deep valley attracted many more specimens than the north bulb which faced the side of a mountain. Lights placed low, as on the forest floor, attracted comparatively few. On the other hand, a lamp resting on a 10-foot bank attracted three times as many moths, as well as more varied forms, than a light on the forest floor. On one occasion a gasoline lantern was placed on a partly cleared peninsula of land that jutted out over a deep, extensive chasm. The light in this instance was able to penetrate the near-by vegetation and reach over above the trees in the chasm. Collecting at this lantern was excellent compared with results from another lantern of the same strength placed at the base of the peninsula. The latter shed most of its light on a region at about the same level as itself.

In 1942 at Caripito, Venezuela, the same factor of height was important. Most collecting was done at a refinery which consisted of several levels or floors of open steelwork. The upper two levels, which were well above the surrounding forests, were always superior to the lower levels as a collecting site. The near-by forests were made up of seasonal forest and palm marsh, broken by patches of savanna one-quarter to one-half mile in diameter. Lanterns placed either in the center or on the edges of these grasslands were discouragingly unproductive, nor was collecting improved when the lights were placed among the trees but on the ground.

At Rancho Grande, when one stood on

[1] Contribution No. 779, Department of Tropical Research, New York Zoological Society.

the floor below the lights, it was possible to see the moths coming from the surrounding territory to the lights. These moths, making a steady stream on good nights, almost invariably rose to the lights. Occasionally one appeared to approach the lights horizontally. I do not recall ever seeing a moth drop down to the lights except when very near or when, having been disturbed near the light, it circled about before returning. Occasionally I have seen moths on the outer fringes of the lights, travelling at right angles to the beam, pass by without being attracted.

Two separate factors seem involved in this attraction to highly-placed lights: first, the majority of moths circulate about the tree-tops, and, second, they simply appear to prefer highly-placed lights.

Moths appear to vary in their selection of the amount of light desirable for their resting place. In particular, many sphinx will select a locality almost in darkness and away from the direct rays of the light. Thus, it is necessary to go searching with a flash-light in the darker regions and shadows in order to be sure of garnering all the sphinx.

It has always been a puzzle to me why moths are more numerous on damp nights or shortly after a rain. The usual explanation that the rain instigated the emergence of the moths has always seemed unsatisfactory. Rain in the morning, afternoon, or even in the early evening, might well stimulate many moths to emerge and consequently increase the total number available for that evening's collecting. It is not reasonable, however, to suppose that the length of time that a short, hard rain lasts is sufficient to allow the moths to emerge, unfold their wings and fly to the lights before the last drops of the shower have fallen.

Rancho Grande offered ideal conditions in which to observe the operation of this rain-and-moth coincidence. The most singular ecological fact was the frequent presence of a cloud cap along the top of the mountain ridges (Beebe and Crane, 1947). On nights when the collecting lights were enshrouded in this fog, the collecting, relative to the season of the year, was invariably good. It was good even if the moon were visible on the periphery of the fog area only half a kilometer away, provided it was dense and deep enough to obliterate the moon. On nights when the fog was so dense as to precipitate, provided the rain was not too driving and windswept, the lights seemed even more attractive. It was a marvel to watch the parade of moths, the sphinx, saturnids and larger moths being most noticeable, come to the lights through a rain that would drench a man in thirty seconds. Nevertheless, the moths would arrive at the light-walls in excellent condition. It can not be that these moths had emerged during the short time the storm had lasted, nor that the high humidity had caused the greater activity. The humidity on other nights, when rain or fog were absent, frequently differed so little as to be negligible. Often, too, a near-by area would be covered by fog, presumably causing this theoretical greater activity, but the unfogged collecting lights would be barren.

Apparently there is some connection between the lights and the particles of water in the atmosphere. The lights on a clear night are clear-cut and sharply illuminate the surrounding area. Our lights could be seen for at least ten kilometers on a clear night. On a foggy night they could barely be perceived from a distance of three kilometers, but the illumination was diffused all about the source as if by a huge reflector. The bulbs or actual source of the light could only be inferred by the more intense radiance in the center.

In general, wind is a hindrance to collecting, though moths are able to reach the light in a surprisingly high wind. They show even greater ability to resist the wind at their resting places. The larger number of moths at Rancho Grande generally selected a wall which was at right angles to the wind.

A cool night, other conditions being favorable, brought out fewer specimens than a warm night.

The best collecting, from the point of view of number of specimens, is between the hours of 7 to 11 in the evening and from approximately 4 in the morning to just before the first flush of dawn. Other conditions may alter this to a limited extent. If it is clear until 9 p. m. and then the weather takes a turn for the better, entomologically, and becomes rainy and foggy, moths will continue to come in until midnight or 1 o'clock. During the two expeditions to Rancho Grande, I have never seen any significant improvement in numbers of moths after 1 p. m., regardless of how favorable climatic conditions might be. This does not mean that excellent and valuable specimens may not be captured out of hours, but that due to the diminished numbers coming to the lights, the possibilities are less. The hours that various species appear vary somewhat. *Amplypterus tigrina* among the sphinx seemed to be among the first arrivals, while some of the Sesiinae were invariably quite late. The few *Sysphinx* captured were taken in the morning hours at Rancho Grande—a fact that was not true at Caripito — while *Copiopteryx* came quite early in the evening. In general, the number of moths taken in the morning hours was not as great as in the evening,

though the effort of collecting in the morning was always amply repaid.

My thanks go to Dr. William Beebe for his valuable assistance and criticism during the writing of this paper.

II. Comparison of Rancho Grande with Other Faunas.

The sphinx moths from three other regions may be compared with the collection from Rancho Grande. At the first locality, Kartabo, British Guiana, the Department of Tropical Research operated a station for portions of eight years, and at the second locality, Caripito, Venezuela, for seven months. Ecologically, Kartabo and Caripito represent different but tropical areas, whereas Rancho Grande is a humid subtropical island within the tropics. The ecology of the first two regions has been published (Beebe, 1925 and 1943) and for a list of the sphinx moths taken, see Beebe and Fleming, 1945. The third region, Hacienda La Trinidad, is only nine kilometers from Rancho Grande but is ecologically very different. This collection was made by P. Cornelius Vogl over a period of 10 years from 1926 to 1936 (Vogl, 1944).

A. Kartabo.

With the exception of the Sesiinae, all the subfamilies of the Sphingidae were captured in greater numbers at Rancho Grande than at Kartabo. The difference between the number of species and specimens of Choerocampinae taken at Kartabo and those taken at Rancho Grande is most significant. Only 8 species and 14 specimens of Choerocampinae were taken at Kartabo, whereas 16 species and 901 specimens were captured at Rancho Grande. The Sesiinae from Kartabo are represented by 12 species not taken at Rancho Grande. Nine taken at Rancho Grande were not found at Kartabo. A significant difference also exists in the Acherontiinae. Only 10 species were captured at Kartabo, compared with 15 species at Rancho Grande.

B. Caripito.

This station was in northeastern Venezuela, at the southern foot of the mountains that lie along the northern coast of Venezuela. Rancho Grande is situated on this same range of mountains in central Venezuela, approximately three hundred and fifty miles to the west of Caripito.

The lights at Caripito attracted moths principally from a palm marsh interrupted by patches of savanna and a deciduous seasonal forest. At the outer edges, four to five kilometers away, evergreen and semi-evergreen seasonal forest prevails, with mangrove woodland along the San Juan River.

As I have said, the most significant difference between the Caripito-Kartabo and the Rancho Grande sphinx faunas is the large number of both species and specimens of Choerocampinae taken at Rancho Grande and their comparative rarity at Caripito. Sixteen species of Choerocampinae with over 901 specimens were taken at Rancho Grande while only 9 species and 17 specimens were captured at Caripito. Only the Acherontiinae and Ambulicinae were more numerous in species at Caripito. Of the Acherontiinae, one specimen of *Phlegethontius dilucida*, a most unusual record, and *Phlegethontius franciscae*, which was common at Caripito, were the only two species taken at Caripito and not at Rancho Grande. *P. franciscae* is closely related to *P. florestan* which was abundant at both localities, making the absence of *franciscae* at Rancho Grande even more significant.

Only 4 species of Ambulicinae were taken at Rancho Grande and all were common; 6 were taken at Caripito but only 2 were common. *Protambulyx strigilis* and *Amplypterus gannascus* are able to exist equally well in the cool, foggy climate of Rancho Grande and in the hot, relatively dry, climate of Caripito. *Amplypterus tigrina* is restricted to the upper cloud cap zone in the Rancho Grande region (Lichy, 1943). *Protambulyx eurycles* was more numerous at Rancho Grande than at Caripito.

The Sesiinae were more numerous at Rancho Grande than at Caripito. *Erinnyis ello* was the commonest species at both places, as it seems to be everywhere in the tropics. Every fifth specimen of Sphingidae taken at Rancho Grande was a member of this species. Neither *Hemeroplanes* nor *Perigonia*, both represented by 3 species at Rancho Grande, were found at Caripito.

The Philampelinae fauna is richer at Rancho Grande than at Caripito. However, one species, *Pholus capronnieri*, taken at Caripito was not found at Rancho Grande. Three species were taken at Rancho Grande and not at Caripito. *Pholus satellitia licaon* was abundant at both localities.

The abundance of the Choerocampinae at Rancho Grande and the scarcity at Caripito has already been commented upon. *Xylophanes chiron nechus* was the commonest choerocampid at both localities. Seven common or abundant species at Rancho Grande were not taken at Caripito. Two species from Caripito, *Xylophanes turbata* and *Xylophanes pistacina*, were not taken at Rancho Grande.

C. Hacienda La Trinidad.

In the years from 1926 to 1936, P. Cornelius Vogl (1944) made a collection at Hacienda La Trinidad approximately 9 kilometers from Rancho Grande. This region is 455 meters high and lies at the foot of the coastal range in the valley of

Lake Valencia. The lake area is largely given up to agriculture and dairying. While La Trinidad is actually in the rich, flat, alluvial lands, it abuts on the low, eroded, grass and chaparral covered mountain savanna (see Beebe and Crane, 1947). This region is very different from Rancho Grande. It is lower, warmer, drier, and the agriculture and dairying have greatly altered the original flora and moisture-retaining properties of the soil.

A total of 46 species was captured at Hacienda La Trinidad over an eleven-year period in comparison with 67 species taken at Rancho Grande in one six-months period. However, the following 12 species were taken at the Hacienda, but not at Rancho Grande: *Phlegethontius hannibal, Isognathus caricae, Pachylia syces, Leucorhampa triptolemus, Madoryx oiclus, Madoryx bubastus, Hemeroplanes pan, Eupyrrhoglossum sagra, Sesia tantalus, Sesia titan, Pholus adamsi* and *Xylophanes turbata. Pholus adamsi* and *Xylophanes turbata* are listed as rare and *Leucorhampa triptolemus* and *Madoryx bubastus* as uncommon. *Madoryx oiclus* has been reported from various localities in Venezuela by Rene Lichy (1944) but not above 700 meters altitude. *Isognathus rimosa papayae* was uncommon at the Hacienda but common at Rancho Grande.

III. Relationship of Sphingidae to Season.

The following tables are self explanatory. Table II shows plainly that there are two main flights of Sphingidae, one in April and May and the other in July. The first flight is the larger, as all subfamilies except one, the Ambulicinae, are more numerous in April and May than in any other month. The Ambulicinae, on the other hand, were more numerous in July. The Sesiinae and Choerocampinae were the dominant subfamilies.

Table I tabulates the species and corroborates the comments concerning Table II. April shows a sharp increase over March in the number of species and the number of moths reaches its zenith in May with 48 species of sphinx caught at the lights. As shown in Table II, another increase after a slack period occurs in July. In August, interestingly enough, a large number of species was captured although the number of specimens was moderate. The two dominant subfamilies in number of species are the Sesiinae and Choerocampinae.

As regards rainfall, the number of specimens does not increase proportionally to the amount of rain. The rain may go on increasing in amount, but after the first few weeks, the moths reach their maximum numbers. The change in average temperature between March and April amounted to only 1.2° C., which, of course, is not of sufficient magnitude to account even in part for their mass emergence. As a matter of fact, the average temperature was lower during the second season, July and August, than in March.

TABLE I.

Number of Species Taken Each Month in 1946.

	Acherontiinae	Ambulicinae	Sesiinae	Philampelinae	Choerocampinae	Total for Month
March	5	3	5	3	9	25
April	8	4	12	5	12	41
May	9	4	16	5	14	48
June	8	4	10	7	11	40
July	9	4	14	6	13	46
August	10	4	12	7	14	47
Total for Six Months	15	4	24	8	16	67

TABLE II.

Number of Specimens Taken Each Month in 1946.

	Acherontiinae	Ambulicinae	Sesiinae	Philampelinae	Choerocampinae	Total for Month
March	42	14	16	12	27	111
April	219	25	311	148	214	917
May	78	26	305	61	176	646
June	105	23	134	23	145	430
July	102	68	113	31	223	537
August	65	43	78	40	116	342
Total for Six Months	611	199	957	315	901	2,983

IV. The Relative Abundance of Species in Various Faunas.

The generalization is often made that in the tropics a large number of species and but few individuals of each species are present, but this is not true of the sphinx taken at the lights of Rancho Grande.

Certainly it is true that a greater number of species are present in the tropics than in the temperate zone. The records from New York City and vicinity list only 46 species of sphingids and some of these are vagrants which have wandered or have been blown from the south, but in a six-months period at Rancho Grande 67 species were collected, not one of which would appear to be other than indigenous to the region. Thus, while we could separate the tropical and temperate faunas from one an-

other on the basis of the number of species, a different picture is revealed when the relative abundance of each species is determined.

If we consider as common these species of which more than 10 specimens were taken during the six months of collecting at Rancho Grande in 1946, we discover that 37 (55%) of the 67 species are common. These 37 species account for 2,866 (96%) of the 2,983 specimens captured. Thirty (45%) species are distributed variously among the remaining 117 specimens. Eight (12%) species may be termed abundant, as more than 100 specimens of each were captured and account for 64% of the specimens obtained. The average number of specimens per species is 44—and if we exclude the abundant species, 18.

It is difficult to compare other regions with Rancho Grande in the same terms, as I have not been able to find other lists in which a definite effort was made to record every specimen of sphinx that came to the lights. However, percentages based on the collection made at Caripito in 1942 are reasonably close, for while many specimens of the common species were disregarded by the collector, the rarer and less common species were collected assiduously. Eleven (22%) of the 51 species taken at Caripito were common, and 78% were rare.

Moss (1920, p. 335) at Pará classified relative abundance under four heads and considered approximately 22 (24%) species to be common or abundant. However, since he does not state how many specimens are the basis of each division, it is difficult to align his categories with mine. It seems probable that part of his "hidden but not rare" group would fit in the lower part of my "common" series.

I have been unable to discover any comparable list for the temperate zone, but 20% to 25% of the species of sphinx found in the northeastern part of the United States may be considered common and the remainder rare or occasional.

A list of Noctuidae was assembled by Walden (1937) in Kansas, and while he used bait rather than light, it is possible to compare the relative abundance of the species within each system. His trap, which was in operation for 2,615 nights, captured 14,741 specimens of 72 species. He excluded the small noctuids and catocalas in his counts. Fifty-four specimens would bear the same relation to his total catch as 11 specimens to the Rancho Grande total. By such a comparison, 21 (20%) species in the temperate zone were common and represented 14,403 (98%) of the specimens, and 80% were rare or occasional.

The collecting at Kansas and Rancho Grande was total and not selective, and therefore it is possible to present the comparisons in another way. Since 72 species were captured at Kansas and 67 species at Rancho Grande, 7 species in each locality represent approximately 10%. The commonest 7 species in Kansas compose 75% of the total catch there, and at Rancho Grande the 7 commonest represent 60%. Thus, in these two localities only 10% of the species make up well over half of the population.

It is not possible to separate the sphinx faunas of the tropics from those of the temperate zone on a basis of the percentage of rare and common species. At Rancho Grande, as a matter of fact, the number of common species of sphinx was greater than the uncommon species. The faunas of Pará, Caripito (and to this the collection the Department made at Kartabo can be added), the northeastern United States and the noctuid collection at Kansas, have the proportion of approximately one common species to three which are rare or occasional. The sphinx fauna at Rancho Grande is unusual in that the proportions are about equal.

The above statements are dependent upon the truth of the assumption that the sphinx attracted to the lights reflect to a reasonable extent the actual number of species and specimens living in a natural state.

V. Annotated List of Species.

Sphingidae.

The most abundant species is *Erinnyis ello;* the number of specimens captured is more than double that of any other species. The four species next most abundant are, in order, *Xylophanes chiron nechus, Phlegethontius florestan, Pholus satellitia licaon* and *Herse cingulata.*

In the following section, the percentages given after the designations "Abundant," "Common," etc., express the proportion of specimens of the respective species to the total number of specimens (3,983) of Sphingidae captured in 1946 *only.* While the Department of Tropical Research was based at Rancho Grande for parts of two years, 1945 and 1946, the collecting done in 1946 was spread over a greater number of months and an effort was made to record all of the Sphingidae arriving at the lights during collecting hours.

My terms for designating comparative abundance of specimens are:

Abundant	101 or more specimens
Common	11 to 100 specimens
Occasional	5 to 10 specimens
Rare	2 to 4 specimens
Unique	One specimen

These terms similarly refer only to specimens taken in 1946.

In the section which follows, when figures

are placed in parentheses after the dates, they refer to the number of specimens taken on that date. A date not followed by a parenthetical figure means that only one specimen was captured.

ACHERONTIINAE.

One out of every five specimens of Sphingidae captured was an acherontiid. The total was 611. *Herse cingulata* and *Phlegethontius florestan*, 2 out of the 15 species taken, totalled 443 specimens or 72% of the subfamily.

Herse cingulata (Fabricius).

Abundant (7.04%).

In 1945, 125 specimens:
May 12, 15 (2), 16, 22, 28.
June 11 (5), 12 (2), 13 (3), 14 (2), 16, 27 (11).
July 1 (5), 3 (42), 4 (3), 5 (3), 6, 11 (19), 12 (5), 14, 16 (16).

In 1946, 210 specimens:
April 17, 18 (4), 21 (3), 22 (3), 30 (3).
May 6, 14, 15, 22 (8), 26 (6).
June 16 (7), 21, 22 (14), 24, 25 (3), 26, 27 (20), 30 (8).
July 1 (21), 4 (2), 5, 16 (3), 18 (2), 19 (19), 20 (12), 21, 22 (4), 24 (2).
August 14 (31).

One of the commonest species of Sphingidae at Rancho Grande. Distributed throughout tropical and subtropical America and occurs as a straggler as far north as Canada.

Cocytius cluentius (Cramer).

Common (.6%).

In 1945, 12 specimens:
May 5.
July 3 (3), 14, 16 (4).

In 1946, 18 specimens:
April 21, 22 (3).
June 22, 26 (2).
July 19 (2), 21, 26.
August 4, 9, 14 (4), 18.

Generally distributed from Mexico to southern Brazil.

Cocytius beelzebuth (Boisduval).

Unique (.03%).

In 1946, 1 specimen:
May 7.

Distributed from Central America to South Brazil.

Cocytius duponchel (Poey).

Common (.6%).

In 1945, 11 specimens:
June 27.
July 5, 11 (2), 12 (2), 16 (4).

In 1946, 18 specimens:
May 22 (2).
June 20, 26, 27 (2).
July 2 (2), 16, 18, 19, 22.
August 8, 13 (2), 14 (3).

Widely distributed in the neotropics.

Cocytius anteus medor (Cramer).

Occasional (.16%).

In 1945, 7 specimens:
June 4.
July 11, 14, 16 (4).

In 1946, 5 specimens:
May 25.
June 22.
July 16.
August 13, 14.

Occurs during the wet season but only in very moderate numbers. Tropics and subtropics.

Cocytius lucifer Rothschild & Jordan.

Unique (.03%).

In 1946, 1 specimen:
June 29.

Generally distributed in the neotropics.

Amphimoea walkeri (Boisduval).

Rare (.13%).

In 1946, 4 specimens:
April 22.
June 17.
August 18, 19.

Since this species occurs throughout a number of months, it is curious that no specimens were captured in 1945. This species often makes a vociferous squeak similar to some of the Cerambycidae when captured. Widely distributed in the neotropics.

Phlegethontius sexta paphus (Cramer).

Rare (.13%).

In 1946, 4 specimens:
May 25, 27.
June 18.
July 26.

Distributed from Central America to Argentina.

Phlegethontius diffissa tropicalis (Rothschild & Jordan).

Common (.8%).

In 1945, 2 specimens:
May 20.
July 5.

In 1946, 24 specimens:
March 28, 30, 31.
April 17, 19, 21, 24 (2), 26 (2).
May 6, 7 (2), 10, 13 (2).
June 18, 21, 22, 26.
July 1 (2).
August 18 (2).

Generally distributed throughout our whole stay in 1946, but only one or two individuals on any one night. Appears to be restricted to tropical South America.

Phlegethontius scutata (Rothschild & Jordan).

Common (1.47%).

In 1945, 12 specimens:
May 9, 15, 22.
June 14.
July 3, 5, 11, 12, 14 (3), 16.

In 1946, 44 specimens:
March 7.

April 17 (2), 18 (2), 19, 20, 21 (3), 23, 30 (3).
May 4, 5, 8 (2), 14, 17, 18, 21, 22, 23, 30.
June 16, 20, 26 (2), 27 (2), 29 (5).
July 1 (3), 16, 19, 21, 25.

Specimens were captured every month except August. Distributed in northern and western South America.

Phlegethontius ochus (Klug).

Unique (.03%).

In 1946, 1 specimen:
August 18.

Distributed from Mexico to northern South America.

Phlegethontius rustica rustica (Fabricius).

Rare (.13%).

In 1945, 1 specimen:
July 12.

In 1946, 4 specimens:
July 16, 20, 22.
August 14.

All specimens were taken long after the rainy season had started. A larva was obtained on May 10 on garbancillo (*Lithospermum mediale* Johnston). This is a species of Boraginaceae native to the Andes but horticulturally used as a hedge plant in many parts of Venezuela. The larva pupated on May 26 and emerged as an adult on June 16. Moss (1920) figures two larvae of this species which occurred on different plants. Our larva resembles his drawing on pl. 2, fig. 1a, except in being darker and in lacking the grayish-white speckling in the ground color.

Generally distributed in tropical and subtropical America.

Phlegethontius albiplaga (Walker).

Common (.97%).

In 1945, 2 specimens:
May 22.
July 11.

In 1946, 29 specimens:
March 22 (2), 31.
April 15, 16, 21 (3), 22 (3), 24 (2), 26.
May 5, 6, 7, 21.
July 19 (2), 21.
August 3, 14, 18 (4), 19.
September 3.

Conspicuously absent during the month of June. Distributed from Mexico to southern Brazil.

Phlegethontius lichenea (Burmeister).

Common (.5%).

In 1945, 7 specimens:
June 4.
July 5, 9 (2), 11 (2), 16.

In 1946, 15 specimens:
March 27, 30 (3).
April 18 (4), 19 (2), 20 (2), 24.
July 16.

Widely distributed from Mexico to Argentina.

Phlegethontius florestan (Cramer).

Abundant (7.8%).

In 1945, 40 specimens:
April 5, 6 (2), 7, 9 (4), 12 (2), 18 (3).
May 2 (2), 3, 10 (2), 11, 13, 14 (5), 15 (5), 19, 20 (2), 22 (3).
July 12.

In 1946, 233 specimens:
March 17, 22, 25 (2), 26 (2), 27 (2), 28 (3), 29, 30 (11), 31 (6).
April 4, 16 (7), 17 (15), 18 (34), 19 (12), 20 (17), 21 (14), 22 (17), 23 (12), 24 (18), 26 (6), 30 (10).
May 4 (2), 5 (8), 6 (10), 7, 10 (3), 13 (3), 14 (2), 21 (3), 22, 23.
June 30.
July 17.
August 14, 16, 18, 19, 26.

Larvae were found on garbancillo in June. Adults emerged in early August. A very abundant species at Rancho Grande. Widely distributed throughout tropical America.

AMBULICINAE.

Only 4 species of this subfamily were found at Rancho Grande, but each was common. A total of 199 (.07%) out of 2,983 sphinx specimens were captured.

Protambulyx eurycles (Herrich-Schäffer).

Common (.87%).

In 1945, 12 specimens:
June 2, 4, 11, 16.
July 1 (2), 5, 9, 11 (3), 16.

In 1946, 26 specimens:
March 22, 30.
April 20.
May 10, 18 (2), 25.
June 16 (2), 21, 26, 27.
July 1 (4), 16 (2), 19, 26 (2).
August 11, 12, 13, 18 (2).

Taken during every month of our stay. Distributed throughout tropical South America.

Protambulyx strigilis (Linnaeus).

Common (2.24%).

In 1945, 29 specimens:
June 4, 24.
July 1, 5, 11 (7), 12 (12), 14 (6).

In 1946, 67 specimens:
April 18.
May 10, 18, 21, 25, 28, 29.
June 18, 22, 26 (3), 29 (2).
July 1 (2), 2 (7), 13, 14 (2), 16 (2), 19 (6), 20 (6), 21 (8).
August 5 (2), 13 (6), 14 (6), 18 (2), 19 (3).

While this species occurred each month of our collecting, the major emergence was in the latter part of July and August. Widely distributed in the American tropics.

Amplypterus gannascus (Stoll).

Common (1.5%).

In 1945, 59 specimens:
April 5, 6, 8, 9.
May 12, 22 (2), 28 (2).
June 2, 12 (3), 13, 16 (2), 27, 28, 29.

July 1 (7), 2, 3 (2), 5 (2), 8 (3), 9 (2), 10, 11 (6), 12 (7), 14 (2), 16 (7).

In 1946, 45 specimens:
March 8, 22, 25 (2), 29.
April 9, 14, 21, 22, 24 (4).
May 7, 14, 21 (3), 25.
June 21, 22 (3), 26 (2), 27.
July 1, 19 (3), 20, 21 (2), 22, 24, 26.
August 5, 7, 8, 13, 18 (3), 19 (2).

This species was more plentiful in 1945 when many of the specimens were disregarded, than in 1946 when all were recorded. Widely distributed throughout the American neotropics.

Amplypterus tigrina (Felder).

Common (2.03%).

In 1945, 30 specimens:
Dry season form *A. t. tigrina* (Felder):
April 5, 13.
May 11, 15.
Wet season form *A. t. simaea* Lichy:
June 1, 28 (2), 29 (3), 30.
July 1 (4), 4 (3), 5, 6 (2), 8, 10, 11 (3), 14, 16 (2).
August 1.

In 1946, 61 specimens:
Dry season form:
March 7, 22, 30 (4).
April 7, 15, 16 (2), 17 (3), 18, 19, 21 (4), 24.
May 4, 7 (2), 18, 25.
Wet season form:
March 30.
May 7 (2), 8, 16, 22, 24.
June 16 (2), 18, 20.
July 16, 17, 18, 20, 21 (4), 22 (2), 24 (3), 26 (2).
August 16 (4), 17, 18 (4), 19.

Distributed in tropical South America.

SESIINAE.

This is the largest subfamily in the western hemisphere with approximately 100 species described. At Rancho Grande we took 24 species. One species, *Erinnyis ello*, was the most abundant sphinx representing 63% of the specimens of this subfamily captured.

Pseudosphinx tetrio (Linnaeus).

Common (1.87%).

In 1945, 16 specimens:
June 1, 11, 12, 27 (2), 28 (2).
July 1 (2), 4, 12 (5), 14.

In 1946, 56 specimens:
March 26.
April 20, 21 (2), 22 (2), 30 (2).
May 6, 18 (2), 21 (4), 25 (9), 28 (6).
June 1, 16, 22 (8), 26 (5), 27 (2).
July 1 (2), 2, 19, 20.
August 14 (3), 18.

Occurred every month of our stay. Distributed from Mexico to Argentina.

Isognathus swainsoni Felder.

Unique (.03%).

In 1946, 1 specimen:
July 21.

This is the most northwestern record for the species. It is listed in the literature as occurring from Surinam to south Brazil though we captured the species at Kartabo and it was common at Caripito.

Isognathus scyron (Cramer).

Unique (.03%).

In 1945, 1 specimen:
July 5.

In 1946, 1 specimen:
August 18.

Distributed from Venezuela to Pará.

Isognathus rimosa papayae (Boisduval).

Common (.46%).

In 1945, 2 specimens:
July 3, 11.

In 1946, 14 specimens:
May 21, 25.
July 16 (5), 19 (2), 20 (2).
August 14, 18, 19.

Distributed in Venezuela and Guiana.

Erinnyis alope (Drury).

Common (2.51%).

In 1945, 69 specimens:
June 4 (3), 13, 27 (5), 28 (2).
July 1 (2), 2, 3 (25), 4, 5 (2), 8, 11 (16), 12 (4), 16 (6).

In 1946, 75 specimens:
April 21 (5), 22 (2), 23, 30 (4).
May 5, 7, 18, 21 (3), 25 (3), 28, 29.
June 1, 16, 18, 21 (6), 22 (3), 26 (3), 27 (4), 29.
July 1 (2), 2, 6, 14, 16, 19 (10), 20 (2), 24.
August 13, 14 (10), 18 (2).

Distributed throughout the American tropics and subtropics.

Erinnyis lassauxi (Boisduval).

Common (.6%).

In 1945, 2 specimens:
form *lassauxi:*
July 14.
form *omphaleae:*
July 10.

In 1946, 18 specimens:
form *lassauxi:*
March 9.
form *omphaleae:*
May 25.
August 14.
form *impunctata:*
May 25.
June 22, 29.
July 1(2), 2, 16, 20, 21 (2), 22, 25 (2).
August 14 (2).

Distributed in tropical and subtropical America.

Erinnyis ello (Linnaeus).

Abundant (20.34%).

In 1945, 49 specimens:
March 27.
April 26.
May 9, 10, 20, 22 (2), 28 (6).
June 4 (8), 10 (2), 11 (3), 13, 27 (2).
July 1 (12), 3 (7), 11.

In 1946, 607 specimens:
March 7, 25 (5), 27, 28 (2), 30, 31.

April 17, 18 (12), 19 (6), 20 (7), 21 (77), 22 (139), 23 (4), 24 (7), 30 (19).
May 5, 6 (10), 7 (12), 8, 13 (20), 14 (14), 18 (44), 21 (15), 22 (8), 24 (24), 25 (6), 26 (34), 28 (8), 29 (2), 30.
June 16 (6), 18 (2), 21, 22 (10), 24, 25 (5), 26 (15), 27 (8), 28 (4), 30 (3).
July 16, 18 (2), 19 (11), 20 (9), 21 (5), 22 (4).
August 13, 18, 26 (26).

The most abundant species at Rancho Grande. One out of every five specimens of sphinx was this species. While indigenous in the American tropics and subtropics, it wanders as far north as Canada.

Erinnyis oenotrus (Cramer).

Common (1.2%).

In 1945, 10 specimens:
May 20.
June 4 (2), 11 (4), 27.
July 1, 4.
In 1946, 36 specimens:
February 25.
March 6, 7.
April 18 (2), 21 (2), 24.
May 6, 14, 18, 19, 25 (5).
June 16, 21 (2), 22 (4), 26 (3).
July 2 (3), 21 (2).
August 13 (2), 14 (2).

Distributed throughout the American tropics and subtropics.

Erinnyis crameri (Schaus).

Common (1.91%).

In 1945, 36 specimens:
May 28 (3).
June 4, 11 (3), 17.
July 1 (2), 3 (3), 4 (2), 5 (3), 8, 11 (9), 12 (2), 16 (6).
In 1946, 57 specimens:
April 3, 24 (2).
May 14, 18 (4), 21 (3), 25 (19), 28.
June 16, 22 (3), 25, 26 (8), 27.
July 1 (2), 2 (2), 19 (5), 22, 26.
August 14.

Found throughout tropical and subtropical America.

Erinnyis obscura obscura (Fabricius).

Occasional (.26%).

In 1945, 3 specimens:
July 3, 4, 5.
In 1946, 8 specimens:
April 23, 24 (2).
May 21, 29.
June 29.
July 2, 16.

Distributed in tropical and subtropical America.

Pachylia ficus (Linnaeus).

Common (.36%).

In 1945, 9 specimens:
July 9, 12, 14 (2), 16 (5).
In 1946, 11 specimens:
May 6.
June 27, 28, 30.
July 1 (2), 25.
August 5, 13 (2), 14.

Ranges from Florida to Argentina.

Pachylia resumens Walker.

Unique (.03%).

In 1945, 1 specimen:
May 31.
In 1946, 1 specimen:
June 18.

Distributed in the American tropics and subtropics.

Oryba kadeni (Schaufuss).

Unique (.03%).

In 1946, 1 specimen:
April 18.

Distributed from Panama to southern Brazil.

Hemeroplanes nomius (Walker).

Rare (.1%).

In 1945, 1 specimen:
July 4.
In 1946, 3 specimens:
April 20, 24 (2).

Distributed from Guatemala to southern Brazil.

Hemeroplanes calliomenae (Schaufuss).

Common (.8%).

In 1945, 9 specimens:
May 22.
July 2, 3 (2), 5, 11, 16.
August 5 (2).
In 1946, 24 specimens:
May 5 (2), 6, 10, 28.
June 7, 24, 26, 27 (3), 28, 29.
July 1 (5), 2 (3), 10, 19, 22.

Recorded from Haiti, Colombia and Venezuela.

Hemeroplanes parce (Fabricius).

Occasional (.33%).

In 1945, 6 specimens:
June 11.
July 4, 6, 16.
August 5, 11.
In 1946, 9 specimens:
May 5, 23.
June 16, 27.
July 1, 19.
August 6, 13, 14.

Widely distributed in the American tropics and subtropics.

Stolidoptera tachasara (Druce).

Unique (.03%).

In 1946, 1 specimen:
April 16.

Ranges from Mexico south to Venezuela.

Epistor lugubris lugubris (Linnaeus).

Occasional (.16%).

In 1945, 5 specimens:
July 16.
August 1, 5 (3).

In 1946, 5 specimens:
May 2, 6.
July 1.
August 13 (2).

A tropical and subtropical species that occasionally wanders as far north as New England.

Epistor ocypete (Linnaeus).

Rare (.06%).

In 1945, 2 specimens:
August 5 (2).
In 1946, 2 specimens:
July 13, 14.
Distributed from Mexico to Paraguay.

Nyceryx tacita (Druce).

Unique (.03%).

In 1946, 1 specimen:
March 25.
Mexico to Bolivia.

Perigonia pallida Rothschild and Jordan.

Common (.46%).

In 1945, 1 specimen:
May 22.
In 1946, 14 specimens:
May 5 (3), 6 (7), 7 (3), 15.
This species emerges very early in the rainy season and does not appear at the lights later in the season. Distributed from Venezuela to Argentina.

Perigonia stulta Herrick-Schäffer.

Rare (.13%).

In 1945, 1 specimen:
May 20.
In 1946, 4 specimens:
April 18.
May 8, 25.
June 25.
Central America to southern Brazil.

Perigonia lusca (Fabricius).

Occasional (.23%).

In 1945, 4 specimens:
form *restituta* (Walker):
June 4.
form *interrupta* Walker:
July 10.
August 5 (2).
In 1946, 7 specimens:
form *restituta:*
April 18.
May 18.
August 13.
form *interrupta:*
April 20.
May 7 (2).
August 13.
Widely distributed in the neotropical region.

Sesia fadus (Cramer).

Unique (.03%).

In 1946, 1 specimen:
April 19.
This specimen was taken from a spider's web where it had been sucked dry by the spider. Found throughout the neotropical region and occasionally in the nearctic region.

PHILAMPELINAE.

Of the 8 species captured, one species, *Pholus satellitia licaon,* accounts for 217 (68%) out of 315 specimens.

Pholus anchemolus (Cramer).

Occasional (.33%).

In 1945, 3 specimens:
July 11 (2), 14.
In 1946, 10 specimens:
April 17, 19, 20, 21.
May 25.
June 22.
July 20.
August 13, 14, 19.
Distributed in the neotropical region.

Pholus triangulum Rothschild and Jordan.

Occasional (.26%).

In 1945,, 2 specimens:
July 1, 16.
In 1946, 8 specimens:
May 7, 18.
June 29.
July 1, 21.
August 16, 18.
Distributed from Mexico to Bolivia.

Pholus satellitia licaon (Cramer).

Abundant (7.27%).

In 1945, 38 specimens:
May 5 (2), 7, 9, 11, 13, 14 (3), 15 (12), 18, 19 (2), 22 (2), 27, 28.
June 11 (2), 12, 17.
July 5, 7, 12 (2), 14, 16.
In 1946, 217 specimens:
March 25, 29, 30.
April 16, 17 (11), 18 (13), 19 (10), 20 (6), 21 (18), 22 (20), 23, 24 (9), 26 (5), 30 (37).
May 4 (5), 5 (7), 6 (11), 7 (4), 8, 13 (4), 14 (2), 21 (3), 25, 28, 29.
June 18, 21, 22 (3), 24, 26, 30.
July 2, 16, 18 (4), 19 (2), 20 (3), 21 (3), 22 (2), 26.
August 13 (4), 14 (8), 16, 18 (2), 19 (3).
Distributed from Mexico to Bolivia and northern Brazil.

Pholus obliquus Rothschild and Jordan.

Common (.87%).

In 1945, 2 specimens:
May 5, 12.
In 1946, 26 specimens:
March 18 (2), 22 (3), 27, 29, 30.
April 18 (2), 20 (2), 23, 24.
June 27.
August 13, 14, 16, 18 (7), 20.
Distributed in tropical South America.

Pholus vitis vitis (Linnaeus).

Common (1.13%).

In 1945, 23 specimens:
May 15, 28 (2).

June 5, 11 (2), 27.
July 1 (4), 3 (3), 6, 11 (2), 12, 14 (3), 16, 18.
In 1946, 34 specimens:
April 18, 22 (2), 24, 26.
May 21 (6), 23, 25 (8).
June 22, 26, 27.
July 16, 18, 19 (2), 20 (2), 21, 29.
August 13 (2), 14.

Distributed throughout the neotropical region and occasionally as far north as New England.

Pholus fasciatus (Sulzer).

Unique (.03%).

In 1946, 1 specimen:
June 27.

Distributed in the neotropics and southern nearctic regions and occurs as straggler in New England.

Pholus phorbas (Cramer).

Occasional (.23%).

In 1946, 7 specimens:
April 22, 24.
June 16, 18.
July 19.
August 16, 19.

Distributed from Venezuela to northern Brazil.

Pholus labruscae (Linnaeus).

Common (.40%).

In 1945, 32 specimens:
June 11 (3).
July 3, 4, 5 (2), 6, 11 (6), 12 (2), 14 (2), 16 (8), 23.
In 1946, 12 specimens:
May 14, 28, 30.
June 26, 27 (3), 30 (2).
July 2, 22.
August 14.

Much more common in 1945 than in 1946. A tropical American species that straggles into the temperate regions.

CHOEROCAMPINAE.

Of the 901 specimens captured, the 4 abundant species comprise 637 (71%) specimens, or somewhat more than 21% of the whole family. One other fact of interest is that only one species was unique, *X. t. thyelia*, and one rare, *C. lineata*. This subfamily, therefore, is the most successful subfamily, as a whole, of the Sphingidae at Rancho Grande.

Xylophanes pluto (Fabricius).

Common (1.27%).

In 1945, 5 specimens:
June 13.
July 1, 5, 8, 11.
In 1946, 38 specimens:
April 21, 23, 24, 30.
May 28, 30.
June 22, 26, 28.
July 2 (2), 16 (2), 19 (5), 20 (5), 21, 22, 26 (4).
August 14 (2), 18 (5), 19 (2).

Distributed from Florida to south Brazil.

Xylophanes tyndarus (Boisduval).

Common (1.27%).

In 1945, 10 specimens:
May 2, 22 (3), 28 (2).
June 27.
July 3, 4, 5.
In 1946, 37 specimens:
March 27, 28, 29, 30 (2), 31.
April 17 (2), 18 (5), 19, 20, 21 (2), 22 (4), 23 (2), 24 (4).
May 4, 5, 6 (2), 7, 18, 22.
June 26.
July 2.
August 1, 13.

Distributed from Mexico to southern Brazil.

Xylophanes porcus continentalis Rothschild and Jordan.

Common (.36%).

In 1945, 1 specimen:
July 8.
In 1946, 11 specimens:
March 30.
May 5 (2), 18.
June 25.
July 16, 20.
August 5, 13, 14, 19.

Distributed from Mexico to southern Brazil.

Xylophanes germen yurakano Lichy.

Abundant (3.41%).

In 1945, 10 specimens:
May 1 (2), 15, 22.
June 6, 11 (3).
July 2, 4.
In 1946, 102 specimens:
March 7, 28, 31.
April 18 (9), 19 (4), 20 (3), 21 (2), 22, 23 (3), 24 (5), 26, 30 (2).
May 5 (8), 6 (3), 7 (4), 8, 10 (2), 13, 16 (2), 17 (2), 18, 21 (6), 22, 23, 25 (3), 26, 30.
June 22 (2), 26 (2).
July 16 (2), 17, 18, 19, 21, 22, 26 (2).
August 5, 14 (4), 16 (2), 18 (3), 23.
September 2.

This subspecies has been reported only from Venezuela.

Xylophanes ceratomioides (Grote and Robinson).

Common (.73%).

In 1945, 7 specimens:
April 15.
May 20.
June 11, 12.
July 1, 11, 14.
In 1946, 22 specimens:
March 9.
April 16, 18 (2), 20 (2), 21, 24, 30.
May 5 (2), 16.
June 26.
July 1, 16, 17, 20, 25, 29.
August 5, 9, 12.

Distributed from Mexico to south Brazil.

Xylophanes anubus (Cramer).

Occasional (.2%).

In 1945, 1 specimen:
July 12.

In 1946, 6 specimens:
May 18.
June 28, 30.
July 22 (2), 26.

Distributed from Mexico to Argentina.

Xylophanes amadis meridanus Rothschild and Jordan.

Common (1.2%).

In 1945, 3 specimens:
May 12.
July 5, 10.

In 1946, 36 specimens:
March 9.
April 18, 19, 21, 22, 24 (5), 26.
May 6, 28.
June 18, 22, 25 (2), 26.
July 18, 21, 22 (4), 24, 26 (5).
August 5, 14, 16 (2), 18 (2).

This subspecies was described from western Venezuela.

Xylophanes chiron nechus (Cramer).

Abundant (8.07%).

In 1945, 71 specimens:
June 4 (2), 11 (5), 16, 27 (7).
July 1 (4), 3 (27), 4 (2), 5 (5), 6 (3), 12 (14), 16.

In 1946, 242 specimens:
March 31.
April 18 (7), 21 (8), 22 (4), 24, 30 (6).
May 3 (2), 5 (4), 7 (2), 10 (12), 14 (10), 21 (4), 22 (13), 24, 25 (12), 26 (20), 28 (3), 29, 30.
June 16, 22 (30), 26 (28), 27 (15), 28 (5), 29 (3), 30 (4).
July 1 (8), 16, 19 (12), 20 (14), 22 (5).
August 14 (5).

Distributed from Mexico to Argentina.

Xylophanes crotonis (Walker).

Abundant (4.02%).

In 1945, 26 specimens:
March 31.
April 2, 5 (4), 6 (6), 7, 8, 9, 12.
May 14 (4), 15, 20 (2).
July 14, 16 (2).

In 1946, 120 specimens:
March 25 (3), 27, 28, 29, 30, 31.
April 16 (2), 17 (5), 18 (24), 19 (8), 20 (3), 21 (14), 22 (13), 23 (6), 24 (5), 26 (2), 30 (2).
May 5 (3), 6 (2), 7, 10 (3), 17, 21, 25 (2).
July 21, 26.
August 13 (4), 14 (7), 16, 19.

All of the above species I consider as belonging to the form *crotonis*. Yet in some respects they are between form *crotonis* and form *aristor*. In the majority of the specimens a definite mesial stripe is present, but it is not gray. Distributed in Central America and northern South America.

Xylophanes titana (Druce)

Abundant (5.79%).

In 1945, 16 specimens:
June 4, 12, 27.
July 1, 3 (2), 4, 5, 8, 10, 11 (3), 12, 13, 16.

In 1946, 173 specimens:
March 22 25, 30 (3).
April 18 (2), 19 (5), 20, 21 (7), 22 (5), 26.
May 5, 18 (2), 20, 21, 22 (2).
June 18, 22 (16), 26 (7), 27 (2).
July 1 (3), 2 (11), 16 (9), 19 (20), 20 (20), 21 (3), 22, 24, 26 (5).
August 5 (5), 13 (20), 14 (7), 18 (3), 19 (6).

Distributed from Mexico to southern Brazil.

Xylophanes resta Rothschild and Jordan.

Occasional (.23%).

In 1945, 3 specimens:
June 2, 4 (2).

In 1946, 7 specimens:
April 18.
May 6, 8, 14, 22.
July 16.
August 16.

Distributed in northern South America.

Xylophanes tersa (Linnaeus).

Common (2.71%).

In 1945, 3 specimens:
July 1, 4, 11.

In 1946, 81 specimens:
May 6, 22 (2), 23 (2), 28 (2), 30.
June 1, 13, 18, 20 (3), 26 (2), 27, 29 (3).
July 1 (2), 2 (7), 16, 19 (12), 20 (4), 21 (12), 22 (3), 24, 26 (3).
August 6, 12, 13 (4), 14 (3), 18 (2), 19 (4), 20.

Found from Canada to Argentina.

Xylophanes neoptolemus (Cramer).

Common (.43%).

In 1945, 13 specimens:
April 20.
May 14.
June 6 (3), 17.
July 1, 3, 5, 7 (2), 8, 9.

In 1946, 13 specimens:
March 22.
April 18.
May 7, 18.
June 26.
July 16 (2).
August 13, 18 (2).
September 2.

Distributed from Mexico to Surinam.

Xylophanes thyelia thyelia (Linnaeus).

Unique (.03%).

In 1945, 2 specimens:
June 13 (2).

In 1946, 1 specimen:
April 14.

Distributed in South America.

Xylophanes pyrrhus Rothschild and Jordan.
Occasional (.33%).

In 1945, 2 specimens:
April 5.
June 11.
In 1946, 9 specimens:
April 18, 20.
May 8, 10.
June 18 (2), 22.
July 7.
August 18.
Distributed in northern South America.

Celerio lineata lineata (Fabricius).
Rare (.1%).

In 1945, 1 specimen:
August 5.
In 1946, 3 specimens:
July 19.
August 18 (2).
Distributed in North and South America.

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